STIC Search Report
EIC 2800

HEATER TUBES

STIC Database Tracking Number: 106874

TO: David Rogers **Location: CP4 8D05** **Art Unit : 2856** **Tuesday, October 28, 2003** **Case Serial Number: 09943189**	**From: Bode Fagbohunka** **Location: EIC 2800** **CP4-9C18** **Phone: 703-605-1726** **bode.fagbohunka@uspto.gov**

Search Notes

Examiner Rogers,

Please find attached the results of your search for 09943189. The search was conducted using the standard collection of databases on dialog for EIC 2800. The tagged references appear to be the closest references located during our search.

If you would like a re-focus please let me know or if you have any questions regarding the search results please do not hesitate to contact me.

Bode Fagbohunka

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Set     Items   Description
S1      45462   ROLL?()BURN? OR COLD()WORK? OR COLDWORKING? OR BURNISH?
S2      70508   (SURFAC??? OR POLISH?)(2N)FINISH?
S3    1225817   NM OR NANO()METER? OR NANOMETER?
S4        240   S2(6N)S3
S5          5   S4 AND S1
S6          2   RD (unique items)
S7        134   S2(3N)S3
S8         25   S7 AND PD<=20000831
S9         20   RD (unique items)
S10        20   S9 NOT S6
S11       746   S1 AND S2
S12       199   S1(6N)S2
S13         4   S12 AND S3
S14         1   RD (unique items)
?  show files
File   2:INSPEC 1969-2003/Oct W3
         (c) 2003 Institution of Electrical Engineers
File   6:NTIS 1964-2003/Oct W4
         (c) 2003 NTIS, Intl Cpyrght All Rights Res
File   8:Ei Compendex(R) 1970-2003/Oct W3
         (c) 2003 Elsevier Eng.  Info. Inc.
File  31:World Surface Coatings Abs 1976-2003/Sep
         (c) 2003 Paint Research Assn.
File  34:SciSearch(R) Cited Ref Sci 1990-2003/Oct W3
         (c) 2003 Inst for Sci Info
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
         (c) 1998 Inst for Sci Info
File  40:Enviroline(R) 1975-2003/Sep
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         (c) 2003 BLDSC all rts. reserv.
File  35:Dissertation Abs Online 1861-2003/Sep
         (c) 2003 ProQuest Info&Learning
File  73:EMBASE 1974-2003/Oct W3
         (c) 2003 Elsevier Science B.V.
File 317:Chemical Safety NewsBase 1981-2003/Oct
         (c) 2003 Royal Soc Chemistry
File 144:Pascal 1973-2003/Oct W3
         (c) 2003 INIST/CNRS
File 114:Encyclopedia of Associations 2003/Sep
         (c) 2003 Gale Research Inc.
File 103:Energy SciTec 1974-2003/Oct B1
         (c) 2003 Contains copyrighted material
File  99:Wilson Appl. Sci & Tech Abs 1983-2003/Sep
         (c) 2003 The HW Wilson Co.
File  94:JICST-EPlus 1985-2003/Oct W4
         (c)2003 Japan Science and Tech Corp(JST)
File 161:Occ.Saf.& Hth. 1973-1998/Q3
         (c) Format only 1998 The Dialog Corp.
File 440:Current Contents Search(R) 1990-2003/Oct 28
         (c) 2003 Inst for Sci Info
File 439:Arts&Humanities Search(R) 1980-2003/Oct W3
         (c) 2003 Inst for Sci Info
File 437:Education Abstracts 1983-2003/Sep
         (c) 2003 The HW Wilson Co
File 420:UnCover 1988-2001/May 31
         (c) 2001 The UnCover Company
File 347:JAPIO Oct 1976-2003/Jun(Updated 031006)
         (c) 2003 JPO & JAPIO
File 350:Derwent WPIX 1963-2003/UD,UM &UP=200369
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6/9/1 (Item 1 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

05918350 E.I. No: EIP01436699985
Title: Ultra-precision grinding of hard steels
Author: Stephenson, D.J.; Veselovac, D.; Manley, S.; Corbett, J.
Corporate Source: Sch. of Indust. and Mfg. Science Cranfield University, Cranfield, Beds., MK43 OAL, United Kingdom
Source: Precision Engineering v 25 n 4 October 2001. p 336-345
Publication Year: 2001
CODEN: PREGDL ISSN: 0141-6359
Language: English
Document Type: JA; (Journal Article) Treatment: T; (Theoretical); X; (Experimental)
Journal Announcement: 0110W4
Abstract: Hardened bearing steel, M50, has been ultra-precision ground to produce an optical quality surface (less than 10 nm R//a) using a novel ultra-stiff machine tool, Tetraform 'C'. It has been shown that a repeatable **surface finish** of less than 10 **nm** R//a can be produced using a 76 mum CBN grit and 500 mum wheel depth of cut. This represents a significant improvement over previous published work using conventional precision machine tools where nanometre surface finish can only be obtained at the expense of process efficiency. The development of optical quality surfaces is considered in terms of the processes occurring in the primary and secondary finishing zones of the cup-wheel, with the final surface finish enhanced by the **burnishing** action of worn CBN grits. It is shown that surface finish is limited by the pull-out of carbides in the secondary finishing zone. However, this can be overcome by using electrolytic in-process dressing (ELID), which maintains CBN grit protrusion and sharpness. This p romotes cutting of the carbides at the ground surface and ensures a high level of surface integrity although the **burnishing** action of grits is reduced resulting in a slightly higher roughness for the steel matrix. copy 2001 Elsevier Science Inc. All rights reserved. 13 Refs.
Descriptors: Steel; Grinding (machining); Surface testing; Metal finishing; Carbides; **Burnishing** ; Electrolytic analysis; Machine tools; Precision engineering
Identifiers: Optical quality surfaces; Ultra-precision grinding; Electrolytic in-process dressing (ELID)
Classification Codes:
801.4.1 (Electrochemistry)
545.3 (Steel); 604.2 (Machining Operations); 423.2 (Test Methods); 804.2 (Inorganic Compounds); 812.1 (Ceramics); 801.4 (Physical Chemistry); 603.1 (Machine Tools, General)
545 (Iron & Steel); 604 (Metal Cutting & Machining); 423 (Non Mechanical Properties & Tests of Building Materials); 804 (Chemical Products Generally); 812 (Ceramics, Refractories & Glass); 539 (Metals Corrosion & Protection; Metal Plating); 801 (Chemistry); 603 (Machine Tools)
54 (METALLURGICAL ENGINEERING, METAL GROUPS); 60 (MECHANICAL ENGINEERING, GENERAL); 42 (BUILDING MATERIALS PROPERTIES & TESTING); 80 (CHEMICAL ENGINEERING, GENERAL); 81 (CHEMICAL ENGINEERING, PROCESS INDUSTRIES); 53 (METALLURGICAL ENGINEERING, GENERAL)

6/9/2 (Item 1 from file: 94)
DIALOG(R)File 94:JICST-EPlus

05247017 JICST ACCESSION NUMBER: 02A0726781 FILE SEGMENT: JICST-E

Mechanism of the Surface Finish Generation in Ultraprecision Cutting of Al-Mg Alloy.

NAKAJIMA TOSHIKATSU (1); OHASHI KAZUHITO (1); YOSHIKAWA MITSUO (2); HIGASHIMOTO OSAMU (3); KINME SHIGETAKA (3)

(1) Okayama Univ., Faculty of Engineering, JPN; (2) Okayama Prefecture Ind. Technol. Center, JPN; (3) Okayama Univ., Graduate School, JPN

Seimitsu Kogakkaishi(Journal of the Japan Society for Precision Engineering), 2002, VOL.68,NO.9, PAGE.1221-1225, FIG.13, REF.10

JOURNAL NUMBER: F0268ABQ ISSN NO: 0912-0289

UNIVERSAL DECIMAL CLASSIFICATION: 621.91

LANGUAGE: Japanese COUNTRY OF PUBLICATION: Japan

DOCUMENT TYPE: Journal

ARTICLE TYPE: Original paper

MEDIA TYPE: Printed Publication

ABSTRACT: In ultraprecision cutting by which **surface finish** is **nano - meter** order, the problems which are not necessary to consider in ordinary cutting occur. One of these is the step at grain boundary on machined surface which is generated by the difference of elastic recovery of crystal grains after cutting edge passing because of mechanical characteristics of crystal grain affected by crystal direction. In this study, in order to make clear the mechanism of the surface finish generation in ultraprecision cutting of Al-Mg alloy, the relationship between clearance angle of tool and surface finish is analyzed quantitatively taking notice of step at grain boundary. As a result, it is confirmed that **burnishing** effect with clearance of cutting tool, which strengthen with a decrease of clearance angle, improves surface finish in ultraprecision cutting of Al-Mg alloy. (author abst.)

DESCRIPTORS: ultraprecision machining; cutting(machining); lathe; mirror finishing; aluminum base alloy; magnesium containing alloy; surface roughness; diamond tool; cutting edge; tool angle; machined surface; grain boundary; orientation(direction); residual stress

BROADER DESCRIPTORS: precision machining; working and processing; machining ; machine tool; machinery; polishing(machining); light alloy; nonferrous alloy; alloy; metallic material; containing alloy; surface quality; flatness(property); property; carbide tool; tool; cutting part ; angle; geometric quantity; face; boundary; stress(mechanics)

CLASSIFICATION CODE(S): QC02010V

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10/9/1 (Item 1 from file: 34)
DIALOG(R)File 34:SciSearch(R) Cited Ref Sci

08033245 Genuine Article#: 239FQ Number of References: 34
Title: Precision grinding and facing of copper-beryllium alloys
Author(s): Hung NP (REPRINT) ; Zhong ZW; Lee KK; Chai CF
Corporate Source: NANYANG TECHNOL UNIV,SCH MECH & PROD ENGN, NANYANG AVE/SINGAPORE 639798//SINGAPORE/ (REPRINT)
Journal: PRECISION ENGINEERING-JOURNAL OF THE AMERICAN SOCIETY FOR PRECISION ENGINEERING, 1999, V23, N4 (OCT), P293-304
ISSN: 0141-6359 Publication date: **19991000**
Publisher: ELSEVIER SCIENCE INC, 655 AVENUE OF THE AMERICAS, NEW YORK, NY 10010
Language: English Document Type: ARTICLE
Geographic Location: SINGAPORE
Subfile: CC ENGI--Current Contents, Engineering, Computing & Technology
Journal Subject Category: INSTRUMENTS & INSTRUMENTATION; ENGINEERING, MANUFACTURING; ENGINEERING
Abstract: This paper investigates the machinability of Cu-Be alloys by ultraprecision grinding and facing. The material temper, tool geometry, and machining parameters are varied to assess their effects on surface finish. The study shows that microgrinding of Cu-Be with a diamond wheel generates a rougher surface finish as compared to that produced by microfacing with a single-point diamond tool. Similar chip formation mechanisms are observed when the depths of cut vary from few millimeters to submicron levels. A mathematical model is derived to compare the theoretical and experimental surface finish. Good agreement between predicted and measured data is obtained, providing grain boundaries are visible on a machined surface when being observed under a microscope. Feedrate and tool radius are the most influential parameters on **surface finish** . Flatness of 20 **nm** on the 9.5 mm diameter rod and roughness of 2 nm R-a and 8 nm R-t are achieved. Although the material's micromachinability is the same for both the aged and unaged alloys, size and distribution of beryllides must be controlled for better tool life and surface finish. (C) 1999 Elsevier Science Inc. All rights reserved.
Descriptors--Author Keywords: ultraprecision machining ; copper beryllium ; chip formation ; diamond turning ; surface finish ; microgrinding
Identifiers--KeyWord Plus(R): METAL-MATRIX COMPOSITES; CUMULATIVE TOOL WEAR; MICROCUTTING PROCESSES; DIAMOND
Cited References:
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10/9/2 (Item 2 from file: 34)

06589208 Genuine Article#: ZD144 Number of References: 19
Title: On the finishing of Si3N4 balls for bearing applications
Author(s): Jiang M; Komanduri R (REPRINT)
Corporate Source: OKLAHOMA STATE UNIV,218 ENGN N/STILLWATER//OK/74078 (REPRINT); OKLAHOMA STATE UNIV,/STILLWATER//OK/74078
Journal: WEAR, 1998, V215, N1-2 (MAR), P267-278
ISSN: 0043-1648 Publication date: **19980300**
Publisher: ELSEVIER SCIENCE SA, PO BOX 564, 1001 LAUSANNE, SWITZERLAND
Language: English Document Type: ARTICLE
Geographic Location: USA
Subfile: CC ENGI--Current Contents, Engineering, Computing & Technology
Journal Subject Category: MATERIALS SCIENCE; ENGINEERING, MECHANICAL
Abstract: The conventional method of producing of Si3N4 balls for bearing applications by grinding and lapping using diamond abrasive at low speeds (<a few hundred rpm) and higher loads (several tens of N/ball) is generally an expensive and time-consuming operation (several weeks). It also leads to the formation of scratches, microcracks, and pits on the finished balls resulting from large radial and circumferential cracks and dislodgement of grains. Since failure of ceramics initiates from such defects, the reliability of Si3N4 balls in service is of prime concern. This paper deals with an alternate technology for finishing Si3N4 balls for hybrid bearing applications using magnetic float polishing (MFP) process that overcomes some of these limitations. A methodology for finishing of HIP'ed Si3N4 balls from the as-received condition by MFP is presented. It involves the mechanical removal of material initially using harder abrasives with respect to the workmaterial (of different materials of progressively lower hardnesses and finer grain sizes) followed by final chemo-mechanical polishing (CMP) using preferably a softer abrasive for obtaining superior finish with minimal surface or subsurface defects, such as scratches, microcracks, or pits on the Si3N4 balls, High material removal rates (1 mu m/min) with minimal subsurface damage is obtained with harder abrasives, such as B4C or SiC (relative to Si3N4) due to the use of a flexible support system, small polishing loads (approximate to 1 N/ball), and fine abrasives but high polishing speeds (compared to conventional polishing) by rapid accumulation of minute amounts of material removed by microfracture. Final polishing of the Si3N4 balls using a softer abrasive, such as CeO2 (that chemo-mechanically react with the Si3N4 workmaterial) results in high quality Si3N4 balls of bearing quality with superior **surface finish** (R-a < 4 **nm** , R-t <

0.04 mu m) and damage-free surface. It is found that CMP is very effective for obtaining excellent surface finish (R-a approximate to 4 nm and R-t approximate to 40 nm) on Si3N4 ceramic material and CeO2 in particular is one of most suitable material for this application. (C) 1998 Elsevier Science S.A.
Descriptors--Author Keywords: magnetic float polishing ; finishing of ceramic balls ; silicon nitride ; chemo-mechanical polishing (CMP) ; cerium oxide
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10/9/9 (Item 3 from file: 103)
DIALOG(R)File 103:Energy SciTec

04155734 LLNL-97-M97051636; EDB-97-064438
Title: Simulations of laser imprint for Nova experiments and for ignition capsules. Revision 1
Author(s)/Editor(s): Weber, S.V.; Glendinning, S.G.; Kalantar, D.H.; Key, M.H.; Remington, B.A.; Rothenberg, J.L. (Lawrence Livermore National Lab., CA (United States)); Wolfrum, E. (Rutherford Appleton Lab., Chilton (United Kingdom)); Verdon, C.P.; Knauer, J.P. (Rochester Univ., NY (United States). Lab. for Laser Energetics)
Corporate Source: Lawrence Livermore National Lab., CA (United States) (Code: 9513035)
Sponsoring Organization: DOE/DP; USDOE Assistant Secretary for Defense Programs, Washington, DC (United States)
Conference Title: Meeting of the Division of Plasma Physics of the American Physical Society
Conference Location: Denver, CO (United States) Conference Date: 11-15 Nov 1996
Publication Date: Dec **1996**
(33 p)
Report Number(s): UCRL-JC-124547-Rev.1 CONF-961102--8
Order Number: DE97051636
Contract Number (DOE): W-7405-ENG-48
Document Type: Report; Conference Literature
Language: English
Journal Announcement: EDB9710
Availability: OSTI; NTIS; INIS; GPO Dep.
Distribution: (Report):H (MF):4 MN-712
Subfile: ETD (Energy Technology Data Exchange); INS (US Atomindex input);

NTS (NTIS).
US DOE Project/NonDOE Project: P
Country of Origin: United States
Country of Publication: United States
Abstract: In direct drive ICF, nonuniformities in laser illumination seed ripples at the ablation front in a process called imprint''. These nonuniformities grow during the capsule implosion and, if initially large enough, can penetrate the capsule shell, impede ignition, or degrade burn. Imprint has been simulated for recent experiments performed on the Nova laser at LLNL examining a variety of beam smoothing conditions. Most used laser intensities similar to the early part of an ignition capsule pulse shape, 1 [approx equal] 10[sup 13] W/cm[sup 2] . The simulations matched most of the measurements of imprint modulation. The effect of imprint upon National Ignition Facility (NIF) direct drive ignition capsules has also been simulated. Imprint is predicted to give modulation comparable to an intrinsic **surface finish** of [approximately]10 **nm** RMS. Modulation growth was examined using the Haan [Phys. Rev. A [bold 39], 5812 (1989)] model, with linear growth factors as a function of spherical harmonic mode number obtained from an analytic dispersion relation. Ablation front amplitudes are predicted to become substantially nonlinear, so that saturation corrections are large. Direct numerical simulations of two-dimensional multimode growth were also performed. The capsule shell is predicted to remain intact, which gives a basis for believing that ignition can be achieved. 27 refs., 10 figs.
Major Descriptors: *ABLATION -- COMPUTERIZED SIMULATION; *ABLATION -- VARIATIONS; *CAPSULES -- ABLATION; *CAPSULES -- NONUNIFORM IRRADIATION; *DIRECT DRIVE LASER IMPLOSION -- COMPUTERIZED SIMULATION; *ICF DEVICES -- PERFORMANCE; *NOVA FACILITY -- PERFORMANCE; *VARIATIONS -- COMPUTERIZED SIMULATION
Broader Terms: CONTAINERS; IMPLOSIONS; IRRADIATION; LASER IMPLOSIONS; SIMULATION; THERMONUCLEAR DEVICES
Subject Categories: 700411* -- Inertial Confinement Devices -- (1992-)
INIS Subject Categories: G5211* -- Inertial confinement devices -- (1992-)

10/9/11 (Item 5 from file: 103)
DIALOG(R)File 103:Energy SciTec

03944448 EDB-96-028208
Title: Fabrication of polymer shells using a depolymerizable mandrel
Author(s): Letts, S.A.; Fearson, E.M.; Buckley, S.R.; Saculla, M.D.; Allison, L.M.; Cook, R. (Lawrence Livermore National Lab., CA (United States))
Source: Fusion Technology v 28:5. Coden: FUSTE8 ISSN: 0748-1896
Publication Date: Dec **1995**
p 1797-1802
Contract Number (DOE): W-7405-ENG-48
Document Type: Journal Article
Language: English
Journal Announcement: EDB9604
Subfile: ETD (Energy Technology Data Exchange); INS (US Atomindex input). IIA (DOE contractor)
US DOE Project/NonDOE Project: P
Country of Origin: United States
Country of Publication: United States
Abstract: A new technique for producing hollow shell laser fusion fuel capsules has-been developed that starts with a depolymerizable mandrel. In this technique we use poly([alpha]-methylstyrene) (PAMS) beads or shells as mandrels which are overcoated with plasma polymer. The PAMS

mandrel is thermally depolymerized to gas phase monomer. which diffuses through the permeable and thermally more stable plasma polymer coating, leaving a hollow shell. Using this technique we made shells from 200 [mu]m to 4 mm diameter with 15 to 100 [mu]m wall thickness having sphericity better than 0.5 [mu]m and **surface finish** better than 10 **nm** RMS. 13 refs., 5 figs., 1 tab.
Major Descriptors: *FUEL PELLETS -- FABRICATION; *POLYSTYRENE -- USES; *SHELLS -- FABRICATION
Descriptors: DEPOLYMERIZATION; IMPACT FUSION; INERTIAL CONFINEMENT; PLASMA; POLYMERS; TARGETS
Broader Terms: CHEMICAL REACTIONS; CONFINEMENT; DECOMPOSITION; MATERIALS; NUCLEAR REACTIONS; NUCLEOSYNTHESIS; ORGANIC COMPOUNDS; ORGANIC POLYMERS ; PELLETS; PETROCHEMICALS; PETROLEUM PRODUCTS; PLASMA CONFINEMENT; PLASTICS; POLYMERS; POLYOLEFINS; POLYVINYLS; SYNTHESIS; SYNTHETIC MATERIALS; THERMONUCLEAR REACTIONS
Subject Categories: 360600* -- Other Materials
360601 -- Other Materials -- Preparation & Manufacture
700411 -- Inertial Confinement Devices -- (1992-)
700460 -- Fusion Technology -- Heating & Fueling Systems; Fuels -- (1992)
700480 -- Fusion Technology -- Component Development; Materials Studies -- (1992-)
INIS Subject Categories: B2400* -- Other Materials
B2410 -- Other Materials -- Preparation & manufacture
G5211 -- Inertial confinement devices -- (1992-)
G5260 -- Fusion Technology -- Heating & fueling systems; fuels -- (1992-)
G5280 -- Fusion Technology -- Component development; materials studies -- (1992-)

10/9/12 (Item 6 from file: 103)
DIALOG(R)File 103:Energy SciTec

03928105 EDB-96-011865
Title: Preparation of hollow shell ICF targets using a depolymerizing model
Author(s)/Editor(s): Letts, S.A.; Fearon, E.M.; Buckley, S.R. (and others)
Corporate Source: Lawrence Livermore National Lab., CA (United States) (Code: 9513035)
Sponsoring Organization: DOE; USDOE, Washington, DC (United States)
Conference Title: Fall meeting of the Materials Research Society
Conference Location: Boston, MA (United States) Conference Date: 28 Nov - 2 Dec 1994
Publication Date: Nov **1994**
(8 p)
Report Number(s): UCRL-JC-119346 CONF-941144--175
Order Number: DE96002564
Contract Number (DOE): W-7405-ENG-48
Document Type: Report; Conference Literature
Language: English
Journal Announcement: EDB9602
Availability: OSTI; NTIS; INIS; GPO Dep.
Distribution: (Report):0 (MF):4 MN-712
Subfile: ERA (Energy Research Abstracts); ETD (Energy Technology Data Exchange); INS (US Atomindex input); NTS (NTIS). IIA (DOE contractor)
US DOE Project/NonDOE Project: P
Country of Origin: United States
Country of Publication: United States
Abstract: A new technique for producing hollow shell laser fusion capsules was developed that starts with a depolymerizable mandrel. In this

technique we use poly(alpha-methylstyrene) (PAMS) beads or shells as mandrels which are overcoated with plasma polymer. The PAMS mandrel is thermally depolymerized to gas phase monomer, which diffuses through the permeable and thermally more stable plasma polymer coating, leaving a hollow shell. We have developed methods for controlling the size of the PAMS mandrel by either grinding to make smaller sizes or melt sintering to form larger mandrels. Sphericity and surface finish are improved by heating the PAMS mandrels in hot water using a surfactant to prevent aggregation. Using this technique we have made shells from 200 [mu]m to 5 mm diameter with 15 to 100 [mu]m wall thickness having sphericity better than 2 [mu]m and **surface finish** better than 10 **nm** RMS.

Major Descriptors: *LASER TARGETS -- DESIGN; *LASER TARGETS -- PRODUCTION
Descriptors: DEPOLYMERIZATION; ICF DEVICES; SHELLS; TEMPERATURE DEPENDENCE; THERMAL ANALYSIS
Broader Terms: CHEMICAL REACTIONS; DECOMPOSITION; TARGETS; THERMONUCLEAR DEVICES
Subject Categories: 700411* -- Inertial Confinement Devices -- (1992-)
INIS Subject Categories: G5211* -- Inertial confinement devices -- (1992-)

10/9/13 (Item 7 from file: 103)
DIALOG(R)File 103:Energy SciTec

03925354 EDB-96-009114
Title: Friction and wear properties of smooth diamond films grown in fullerene-argon plasmas
Author(s)/Editor(s): Erdemir, A.; Fenske, G.R.; Bindal, C.; Zuiker, C.; Krauss, A.R.; Gruen, D.M.
Corporate Source: Argonne National Lab., IL (United States) (Code: 0448000)
Sponsoring Organization: DOE; USDOE, Washington, DC (United States)
Conference Title: 6. European conference on diamond, diamond-like and related materials
Conference Location: Barcelona (Spain) Conference Date: 10-15 Sep 1995
Publication Date: Aug **1995**
(30 p)
Report Number(s): ANL/ET/CP-87528 CONF-9509137--1
Order Number: DE96002774
Contract Number (DOE): W-31109-ENG-38
Document Type: Report; Conference Literature
Language: English
Journal Announcement: EDB9602
Availability: OSTI; NTIS; GPO Dep.
Distribution: (Report):A (MF):4 MN-404
Subfile: ERA (Energy Research Abstracts); ETD (Energy Technology Data Exchange); NTS (NTIS). TIC (Technical Information Center)
US DOE Project/NonDOE Project: P
Country of Origin: United States
Country of Publication: United States
Abstract: In this study, we describe the growth mechanism and the ultralow friction and wear properties of smooth (20-50 nm rms) diamond films grown in a microwave plasma consisting of Ar and fullerene (the carbon source). The sliding friction coefficients of these films against Si[sub 3]N[sub 4] balls are 0.04 and 0.1 in dry N[sub 2] and air, which are comparable to that of natural diamond sliding against the same pin material, but is lower by factors of 5 to 10 than that afforded by rough diamond films grown in conventional H[sub 2]-CH[sub 4] plasmas. Furthermore, the smooth diamond films produced in this work afforded wear rates to Si[sub 3]N[sub 4] balls that were two to three orders of

magnitude lower than those of H[sub 2]-CH[sub 4] grown films. Mechanistically, the ultralow friction and wear properties of the fullerene-derived diamond films correlate well with their initially smooth surface finish and their ability to polish even further during sliding. The wear tracks reach an ultrasmooth (3-6 **nm** rms) **surface finish** that results in very little abrasion and ploughing. The nanocrystalline microstructure and exceptionally pure sp[sup 3] bonding in these smooth diamond films were verified by numerous surface and structure analytical methods, including x-ray diffraction, high-resolution AF-S, EELS, NEXAFS, SEM, and TEM. An AFM instrument was used to characterize the topography of the films and rubbing surfaces.
Major Descriptors: *DIAMONDS -- SLIDING FRICTION; *DIAMONDS -- WEAR RESISTANCE
Descriptors: FILMS; SILICON NITRIDES
Broader Terms: CARBON; ELEMENTAL MINERALS; ELEMENTS; FRICTION; MECHANICAL PROPERTIES; MINERALS; NITRIDES; NITROGEN COMPOUNDS; NONMETALS; PNICTIDES; SILICON COMPOUNDS
Subject Categories: 360603* -- Materials -- Properties

10/9/14 (Item 8 from file: 103)
DIALOG(R)File 103:Energy SciTec

03637759 EDB-94-053725
Title: The effects of process parameters on the surface finish of plasma polymers
Author(s): Letts, S.A.; Cook, R.C.; Welch, P.; McEachern, R.; Fearon, E. (Lawrence Livermore National Laboratory, CA (United States))
Title: 205th ACS national meeting
Conference Title: 205. American Chemical Society national meeting
Conference Location: Denver, CO (United States) Conference Date: 28 Mar - 2 Apr 1993
Publisher: Washington, DC (United States) American Chemical Society
Publication Date: **1993**
p 323, Paper POLY 193 (1951 p)
Report Number(s): CONF-930304--
Document Type: Analytic of a Book; Conference Literature
Language: English
Journal Announcement: EDB9408
Availability: American Chemical Society, Room 420, 1155 16th St., N.W., Washington, DC 20036-4899 (United States)
Subfile: ETD (Energy Technology Data Exchange). IIA (DOE contractor)
US DOE Project/NonDOE Project: P
Country of Origin: United States
Country of Publication: United States
Abstract: The surface finish of plasma polymers deposited in an inductively coupled discharge were measured as a function of gas flow rates. Surface finish was measured both optically and by AFM. The process parameters of the plasma polymerization were found to affect the surface finish. The gases used were trans-2-butene and hydrogen for hydrocarbon polymers. For bromocarbon polymers the authors added ethylbromide. The smoothest hydrocarbon polymer coatings has an RMS **surface finish** better than 1 **nm** . Bumps 200 nm high spaced approximately 1 [mu] apart grew on the surface of bromocarbon coatings when they were exposed to air. The composition of the bumps was found to be NH[sub 4]Br by XRD and XPS analysis. The authors believe that nitrogen (from a small leak or desorption) dissociates in the discharge and reacts with hydrogen to form ammonia. The ammonia then reacts with HBr, a dissociation product of ethylbromide, to form NH[sub 4]Br which is dispersed throughout the deposited layer. Humidity facilitates the

transport of the NH[sub 4]Br to the surface where it crystallizes. Bump growth was prevented by either dry storage or overcoating with 3 [mu]m of hydrocarbon plasma polymer. Alternatively, the bumps could be washed from the surface with water.
Major Descriptors: *HYDROCARBONS -- BROMINATION; *HYDROCARBONS -- POLYMERIZATION; *ORGANIC POLYMERS -- SURFACE FINISHING; *ORGANIC POLYMERS -- SURFACE PROPERTIES; *SURFACE FINISHING -- PROCESS CONTROL
Descriptors: PARAMETRIC ANALYSIS
Broader Terms: CHEMICAL REACTIONS; CONTROL; HALOGENATION; ORGANIC COMPOUNDS ; POLYMERS
Subject Categories: 360601* -- Other Materials -- Preparation & Manufacture
360602 -- Other Materials -- Structure & Phase Studies
400201 -- Chemical & Physicochemical Properties

10/9/16 (Item 10 from file: 103)
DIALOG(R)File 103:Energy SciTec

01617915 EDB-85-124690
Title: Prints for precision engineering research lathe (Engineering Materials)
Corporate Source: Lawrence Livermore National Lab., CA (USA)
Publication Date: Dec **1982**
Report Number(s): CAPE-2944
Order Number: TI85011046
Contract Number (DOE): W-7405-ENG-48
Note: 146 35-mm aperture cards
Document Type: Engineering Material
Language: English
Journal Announcement: ERA8508
Availability: OSTI, PO Bx 62, Oak Ridge, TN 37831
Subfile: ERA (Energy Research Abstracts).
Country of Origin: United States
Country of Publication: United States
Abstract: The precision engineering research lathe (PERL) is a small two-axis, ultra-high-precision turning machine used for turning very small contoured parts. Housed in a laminar-flow enclosure for temperature control, called a clean air envelope, PERL is maintained at a constant 68 degrees F (plus or minus 1 degree). The size of the lathe is minimized to reduce sensitivity to temperature variations. This, combined with internal water cooling of the spindle motor, the only major heat source on the machine, permits the use of air-shower temperature control. (This approach is a departure from previous designs for larger machines where liquid shower systems are used.) Major design features include the use of a T-configuration, hydrostatic oil slides, capstan slide drives, air-bearing spindles, and laser interferometer position feedback. The following features are particularly noteworthy: (1) to obtain the required accuracy and friction characteristics, the two linear slides are supported by 10-cm-travel hydrostatic bearings developed at LLNL; (2) to minimize backlash and friction, capstan drives are used to provide the slide motions; and (3) to obtain the best surface finish possible, asynchronous (nonrepeatable) spindle motion is minimized by driving the spindle directly with a brushless dc torque motor. PERL operates in single-axis mode. Using facing cuts on copper with a diamond tool, **surface finishes** of 7.5 **nm** peak-to-valley (1.5 nm rms) have been achieved.
Major Descriptors: *LABORATORY EQUIPMENT -- LATHES; *LATHES -- DESIGN; *LATHES -- HYDROSTATIC BEARINGS

Descriptors: MECHANICAL ENGINEERING; SURFACE FINISHING
Broader Terms: BEARINGS; ENGINEERING; EQUIPMENT; MACHINE TOOLS; TOOLS
Subject Categories: 420200* -- Engineering -- Facilities, Equipment, & Techniques

10/9/17 (Item 11 from file: 103)
DIALOG(R)File 103:Energy SciTec

00917842 ERA-07-035260; INS-82-009701; EDB-82-092689
Title: Copper coated laser fusion targets using molecular beam levitation
Author(s): Rocke, M.J.
Affiliation: Lawrence Livermore National Laboratory, P. O. Box 5508, Livermore, California 94550
Source: J. Vac. Sci. Technol. (United States) v 20:4. Coden: JVSTA
Publication Date: Apr **1982**
p 1325-1327
Contract Number (DOE): W-7405-ENG-48
Document Type: Journal Article
Language: English
Journal Announcement: EDB8204
Subfile: INS (US Atomindex input); ERA (Energy Research Abstracts).
Country of Origin: United States
Abstract: A series of diagnostic experiments at the Shiva laser fusion facility required targets of glass microspheres coated with 1.5--3.0 ..mu..m of copper. Previous batch coating efforts using vibration techniques gave poor results due to microsphere sticking and vacuum welding. Molecular beam levitation (MBL) represented a noncontact method to produce a sputtered copper coating on a single glass microsphere. The coating specifications that were achieved resulted in a copper layer up to 3 ..mu..m thick with the allowance of a maximum variation of 10 **nm** in **surface finish** and thickness. These techniques developed with the MBL may be applied to sputter coat many soft metals for fusion target applications.;
Major Descriptors: *COPPER -- SPUTTERING; *COPPER -- SURFACE COATING; *GLASS -- COATINGS; *MICROSPHERES -- COATINGS
Descriptors: ARGON; GRAIN GROWTH; INERTIAL CONFINEMENT; LASER TARGETS; MOLECULAR BEAMS; THICKNESS
Broader Terms: BEAMS; CONFINEMENT; DEPOSITION; DIMENSIONS; ELEMENTS; FLUIDS ; GASES; METALS; NONMETALS; PLASMA CONFINEMENT; RARE GASES; TARGETS; TRANSITION ELEMENTS
Subject Categories: 700208* -- Fusion Power Plant Technology -- Inertial Confinement Technology
700205 -- Fusion Power Plant Technology -- Fuel, Heating, & Injection Systems
INIS Subject Categories: A14* -- Plasma Physics & Thermonuclear Reactions
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